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Application No.: 10/657,978

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

1. (Currently Amended) An illumination apparatus comprising:

a small-plane light source having diffusion radiation characteristics;

a columnar light leading member, having an incident end surface, an outgoing radiation end surface and a reflection surface, configured to reflect on the reflection surface at least a part of a light ray from the small-plane light source collected from the incident end surface, thereby leading the light to the outgoing radiation end surface; and

an angle position converting member configured to convert an outgoing light angle intensity of the outgoing light from the outgoing radiation end surface of the columnar light leading member into a position intensity in a predetermined irradiation area, ~~whereby~~ wherein a ~~the~~ distance between the ~~outgoing radiation surface and~~ the angle ~~portion~~ position converting member and the predetermined radiation area is ~~are~~ substantially equal to a focal distance of the angle position converting member.

2. (Original) The apparatus according to claim 1, wherein

the angle position converting member includes a pupil forming member configured to form a pupil by using the outgoing radiation end surface of the columnar light leading member as a virtual light source, and

a position of the irradiation area is set in the vicinity of a position of a pupil formed by the pupil forming member.

3. (Original) The apparatus according to claim 2, wherein

the pupil forming member includes an illumination lens configured to condense the light from the outgoing radiation end surface of the columnar light leading member, and

the predetermined irradiation area is set in the vicinity of a focal position of the illumination lens.

Claims 4-6 (cancelled)

7. (Previously presented) The apparatus according to claim 2, wherein ~~a~~ an outgoing light beam angle of the columnar light leading member is configured to substantially match with an incident side numerical aperture when forming a pupil with a predetermined size by the pupil forming member.

Claims 8-12 (Cancelled)

13. (Previously presented) The apparatus according to claim 1, wherein the columnar light leading member has a tapered shape such that an area of the outgoing radiation end surface is larger than an area of the incident end surface.

14. (Currently amended) The apparatus according to claim 13, wherein the columnar light leading member has an anisotropy in a ratio of a size of the incident end surface and a size of the outgoing radiation end surface, and

one of a ratio of lengths measured in a horizontal direction and a ratio of lengths measured in a vertical direction of the outgoing radiation end surface relative to the incident end surface of the columnar light leading member is larger than the other, and

the outgoing radiation end surface of the columnar light leading member is positioned at a focal point such that an extent of the illuminated area differs in the horizontal and vertical directions such that the direction of a larger extent of light in the illuminated area is similar to the direction of the smaller size ratio in the columnar light leading member. ~~the columnar light leading member is configured such that a length in one direction of the incident end surface becomes a smaller length in said direction at the outgoing irradiation end surface~~.

15. (Original) The apparatus according to claim 13, wherein the incident end surface and the outgoing radiation end surface of the columnar light leading member have shapes similar to each other.

Claims 16-18 (Cancelled)

19. (Original) The apparatus according to claim 1, wherein the columnar light leading member includes a rod constituted by an optical plane made of a transparent material.

20. (Original) The apparatus according to claim 1, wherein the columnar light leading member includes a mirror pipe having a hollow structure whose inner surface is constituted by a reflecting mirror.

21. (Currently amended) The apparatus according to claim 1, wherein the columnar light leading member has an anisotropy in a ratio of a size of the incident end surface and a size of the outgoing radiation end surface, and

one of a ratio of lengths measured in a horizontal direction and a ratio of lengths measured in a vertical direction of the outgoing radiation end surface relative to the incident end surface of the columnar light leading member is larger than the other, and

the outgoing radiation end surface of the columnar light leading member is positioned at a focal point such that an extent of the illuminated area differs in the horizontal and vertical directions such that the direction of a larger extent of light in the illuminated area is similar to the direction of the smaller size ratio in the columnar light leading member.

~~the columnar light leading member configured such that a length in one direction of the irradiation area at the incident and surface becomes a smaller length in said direction at the outgoing irradiation end surface.~~

22. (Original) The apparatus according to claim 1, wherein the incident end surface and the outgoing radiation end surface of the columnar light leading member have shapes similar to each other.

Claims 23 and 24 (Cancelled)

25. (Previously presented) An image projection apparatus comprising:

an illumination apparatus comprising:

a small-plane light source having diffusion radiation characteristics;

a columnar light leading member, having an incident end surface, an outgoing radiation end surface and a reflection surface, configured to reflect on the reflection surface at least a part of a light ray from the small-plane light source collected from the incident end surface, thereby leading the light to the outgoing radiation end surface; and

an angle position converting member configured to convert an outgoing light angle intensity of the outgoing light from the outgoing radiation end surface of the columnar light leading member into a position intensity in a predetermined irradiation area;

a light modulation element, having a pixel structure, configured to modulate a light ray for each pixel in accordance with an image signal; and

a projection lens configured to enlarge and project the light modulation element, wherein

the light modulation element is arranged in the illumination area in the illumination apparatus and the distance between the outgoing radiation end surface and the angle position converting member and the distance between the angle position converting member and the light modulation element are substantially equal.

26. (Original) The apparatus according to claim 25, wherein

the angle position converting member includes a pupil forming member configured to form a pupil by using the outgoing radiation end surface of the columnar light leading member as a virtual light source, and

a position of the irradiation area is set in the vicinity of a position of a pupil formed by the pupil forming member.

27. (Original) The apparatus according to claim 26, wherein

the pupil forming member includes an illumination lens configured to condense the light from the outgoing radiation end surface of the columnar light leading member, and

the predetermined irradiation area is set in the vicinity of a focal position of the illumination lens.

Claims 28-30 (Cancelled)

31. (Previously presented) The apparatus according to claim 26, wherein an outgoing light beam angle of the columnar light leading member is configured to substantially match an incident side numerical aperture when forming a pupil with a predetermined size by the pupil forming member.

37. (Previously presented) The apparatus according to claim 25, wherein the columnar light leading member has a tapered shape such that an area of the outgoing radiation end surface is larger than an area of the incident end surface.

Claims 32-36 (Cancelled)

38. (Currently amended) The apparatus according to claim 37, wherein the columnar light leading member has an anisotropy in a ratio of a size of the incident end surface and a size of the outgoing radiation end surface, and

one of a ratio of lengths measured in a horizontal direction and a ratio of lengths measured in a vertical direction of the outgoing radiation end surface relative to the incident end surface of the columnar light leading member is larger than the other, and

the outgoing radiation end surface of the columnar light leading member is positioned at a focal point such that an extent of the illuminated area differs in the

horizontal and vertical directions such that the direction of a larger extent of light in the illuminated area is similar to the direction of the smaller size ratio in the columnar light leading member.

~~that a length in one direction of the irradiation area at said incident end surface becomes a smaller length in said one direction at the outgoing irradiation end surface.~~

39. (Original) The apparatus according to claim 37, wherein the incident end surface and the outgoing radiation end surface of the columnar light leading member have shapes similar to each other.

Claims 40-42 (Cancelled)

43. (Original) The apparatus according to claim 25, wherein the columnar light leading member includes a rod constituted by an optical plane made of a transparent material.

44. (Original) The apparatus according to claim 25, wherein the columnar light leading member includes a mirror pipe having a hollow structure whose inner surface is constituted by a reflecting mirror.

45. (Currently amended) The apparatus according to claim 25, wherein the columnar light leading member has an anisotropy in a ratio of a size of the incident end surface and a size of the outgoing radiation end surface, and

one of a ratio of lengths measured in a horizontal direction and a ratio of lengths measured in a vertical direction of the outgoing radiation end surface relative to the incident end surface of the columnar light leading member is larger than the other, and

the outgoing radiation end surface of the columnar light leading member is positioned at a focal point such that an extent of the illuminated area differs in the horizontal and vertical directions such that the direction of a larger extent of light in the illuminated area is similar to the direction of the smaller size ratio in the columnar light leading member.

~~the columnar light leading member is configured such that a length in one direction of the irradiation area at the incident end surface becomes smaller in said direction at the outgoing radiation end surface.~~

46. (Original) The apparatus according to claim 25, wherein the incident end surface and the outgoing radiation end surface of the columnar light leading member have shapes similar to each other.

Claims 47 and 48 (Cancelled)

49. (Previously presented) An illumination apparatus comprising:

a small-plane light source having diffusion radiation characteristics;

columnar light leading means, having an incident end surface, an outgoing radiation end surface and a reflection surface, for reflecting on the reflection surface

at least a part of a light ray from the small-plane light source collected from the incident end surface, thereby leading the light to the outgoing radiation end surface; and

angle position converting means for converting an outgoing light angle intensity of the outgoing light from the outgoing radiation end surface of the columnar light leading means into a position intensity in a predetermined irradiation area and the distance between the outgoing radiation end surface and the angle position converting means and the distance between the angle position converting means and the light modulation element are substantially equal.

50. (Previously presented) An image projection apparatus comprising: an illumination apparatus comprising:

a small-plane light source having diffusion radiation characteristics;

columnar light leading means, having an incident end surface, an outgoing radiation end surface and a reflection surface, for reflecting on the reflection surface at least a part of a light ray from the small-plane light source collected from the incident end surface, thereby leading the light to the outgoing radiation end surface; and

angle position converting means for converting an outgoing light angle intensity of the outgoing light from the outgoing radiation end surface of the

columnar light leading means into a position intensity in a predetermined irradiation area;

a light modulation element, having a pixel structure, for modulating a light ray for each pixel in accordance with an image signal; and

a projection lens for enlarging and projecting the light modulation element, wherein

the light modulation element is arranged in the illumination area in the illumination apparatus and the distance between the outgoing radiation end surface and the angle position converting means and the distance between the angle position converting means and the light modulation element are substantially equal.

Claim 51 (Cancelled)

52 (Previously presented) The apparatus according to claim 1 wherein the incident end surface and outgoing radiation end surface are planar surfaces.

53. (Previously presented) The apparatus according the claim 25, wherein said distance is a focal length distance.

54. (Previously presented) The apparatus according to claim 25, wherein the incident end surface and outgoing radiation end surface are planar surfaces.